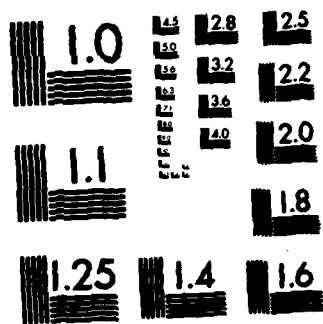


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Department of Defence
Defence Science and Technology Organization
Armed Forces Food Science Establishment
Scottsdale, Tasmania

AFFSE REPORT 1/86

EVALUATION OF
AUSTRALIAN RATION PACKS
REVISION OF
COMBAT RATION ONE MAN (U)

C. H. FORBES-EWAN

D. R. WATERS

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DEPARTMENT OF DEFENCE
ARMED FORCES FOOD SCIENCE ESTABLISHMENT

AFFSE REPORT 1/86

**FIELD EVALUATION OF AUSTRALIAN
RATION PACKS**

REVISION OF COMBAT RATION ONE MAN

(U)

C. H. FORBES-EWAN and D. R. WATERS

SUMMARY

Three field acceptability surveys have shown that the Combat Ration One Man (CRIM) includes many items of low or marginal acceptability. Some minor differences of opinion were revealed for the three groups surveyed — foot-soldiers, mechanised infantry and service corps.

Recommendations to improve the acceptability of CRIM are made. A sample revised menu is presented.

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16. Abstract

Three field acceptability surveys have shown that the Combat Ration One Man (CRIM) includes many items of low or marginal acceptability. Some minor differences of opinion were revealed for the three groups surveyed — foot soldiers, mechanised infantry and service corps.

Recommendations to improve the acceptability of CRIM are made. A sample revised menu is presented.

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INTRODUCTION

Operational rations are defined as "Rations used in a theatre of war. They may be issued as individual items or in a packed form" (DOD, 1984). For group feeding, the first choice in both combat and non-combat situations is fresh food. This is mainly because of its high consumer acceptance. When fresh foodstuffs or refrigeration resources are unavailable, canned equivalent rations are issued for group rationing and, in certain circumstances, individual rationing. Combat rations are packed rations for use when circumstances preclude the issue of fresh or canned equivalent rations.

Five types of combat rations are used by the Australian Army: Combat Ration Ten Man (CR10M), Patrol Ration One Man (PRIM), Combat Ration One Man (CRIM), Individual Meal Combat Ration (IMCR) and Emergency Ration.

CR10M is designed for group feeding, either by small detachments with their own transport such as tank crews and mechanised infantry, or prepared by the Australian Army Catering Corps when fresh and canned equivalent are unavailable.

The PRIM and CRIM are for individual rationing in situations where group feeding is not feasible. Examples of such situations may include patrols in dense forest and units under fire.

The IMCR is a new ration designed to provide food for a soldier who will be away from base camp for only one meal. An example is a driver who has breakfast and dinner at base camp and takes an IMCR for lunch.

The Emergency Ration is used under field conditions when extra energy is required.

Apart from CR10M, all ration packs must be able to be prepared with only a heating device and water. All combat ration packs must have main meal items which can be eaten without preparation. They must be as compact and light as possible, yet have sufficiently robust packaging to prevent damage by insects, rodents, and the elements or transportation. All combat ration packs are required to have shelf life of at least 12 months in temperate areas and 9 months in tropical areas. This period begins when the pack is issued from the assembly line; individual components may be 12 months old at the time of issue. Ration packs should consist of components made in Australia, they must satisfy nutritional requirements and they must be acceptable to Australian servicemen (DOD, 198?).

Nutritional adequacy of combat rations was reported by James et al (1984). Acceptability of CR10M was reported by Badcock (1985). Badcock and Lichtenstein (1978) dealt with acceptability of PRIM and CRIM.

The most recent study of the field acceptability of CRIM was that by Lichtenstein (1979). Complaints about lack of variety within ration packs, a constantly changing clientele and the altering tastes and expectations of young Australians all suggest that another survey of the acceptability of CRIM is overdue. This report deals with the field acceptability and service suitability of CRIM (83/84 packing programme) to regular soldiers.

METHODS

The survey was conducted during three field trips using a questionnaire and by an observer talking to small groups of soldiers to gain subjective impressions. The questionnaire was designed in consultation with 1 Psychology Unit. A copy of the questionnaire is enclosed.

Assistance was sought from Headquarters Field Force Command in identifying suitable field exercises. The criteria for suitability included:

(i) A minimum of 200 soldiers;

(ii) All five varieties of CRIM to be issued to all participants and all varieties to be used in approximately equal proportions;

(iii) No access to other food sources during the exercise period.

The exercises chosen for this survey represent a range of climatic conditions (tropical and cool temperate), terrains (rugged, close country and flat, open grassland) and workloads (low and moderate to heavy).

A total of 641 completed questionnaires was obtained from three field trips. These trips were to (i) Exercise Coral Dagger; (ii) Exercise Raw Tiger; and (iii) HQ 1 Division (Enoggera).

(i) Exercise Coral Dagger was conducted in the Bluewater area inland from Townsville, June 1985. Infantry from 1 RAR (foot-soldiers), lived on CRIM for about two weeks. During the exercise they were engaged in clearing patrols in rugged terrain which was covered with dense forest. The work load varied from moderate to heavy. Each soldier carried his normal pack and three days' rations. Resupply was by helicopter. Although the exercise was in a tropical area, heat was not a problem — nights were cool and days mild to warm.

Altogether, 400 questionnaires were issued, 200 after 5 days and the remainder at the end of the exercise. A total of 260 completed questionnaires was returned. Comments and opinions were sought from small groups (usually sections). The results of this field trip are considered to be representative of the opinions of foot-soldiers.

(ii) Exercise Raw Tiger was conducted near Puckapunyal in July 1985. Mechanised Infantry from 5/7 RAR were engaged in a winter exercise in an area consisting mainly of open, flat grassland. Workloads were light as transport was by Armoured Personnel Carrier. In addition to CRIM, these soldiers were able to carry fresh rations, commercially canned and dried foods, and had various means of food preparation, including "Jaffle" irons and LPG stoves.

Weather conditions were normal for July — light frosts were common and days were cool to mild.

A total of 250 questionnaires was issued; 192 completed questionnaires were collected. Comments from small groups were recorded. The results of this field trip were taken to represent those of mechanised infantry.

(iii) A trip was also made to HQ 1 Division (Enoggera, Queensland) to survey soldiers in 'service' corps (Signals, Transport, Engineers, RAEME, Ordnance and Artillery). This survey had to be conducted in barracks as a suitable field exercise could not be identified. Therefore, the wording of some questions had to be modified, but the content was not altered. A total of 189 completed questionnaires was collected from service corps soldiers.

Preliminary statistical analysis of the results from each field trip was done using Microstat software. The results of the three surveys were then combined and analysed as representing the Australian Regular Army. This was done with NWA Statpak Software.

Because of the similar background, average age and average number of years of service of each group, differences in taste were regarded as unlikely. Therefore, the results for individual surveys were compared only for those questions where a difference of opinion might be expected. Differences were thought to be likely in respect of desirable quantities of food, so comparison of groups was confined to their responses to the following questions:

"Did you discard any items?" (Q.1);

"Is there sufficient condensed milk?" (Q.11);

"Do you require more brews?" (Q14);

"In general, is there enough food in each ration pack?" (Q.27).

Analysis of these questions was by Chi-square test.

Additionally, in question 20, the soldier is asked to list 'problems' he has with each meat meal. Examples of possible problems are given; these include "insufficient quantity". Comparison of group responses to this question was made using analysis of variance.

RESULTS

A. Grouped Sample *

1. Characteristics of the Sample

Table 1 shows number of respondents, average age and number of years of service for each group.

TABLE 1: Characteristics of the sample

GROUP	NUMBER OF RESPONDENTS	AVERAGE AGE	AGE RANGE	AVERAGE YEARS OF SERVICE	RANGE OF YEARS OF SERVICE
1 RAR (Townsville)	260	23.0	18-37	4.6	1-19
5/7 RAR (Puckapunyal)	192	23.6	17-45	5.3	1-20
Service Corps (Brisbane)	189	24.6	17-44	5.3	1-20

The greater number of respondents from 1 RAR reflects the higher proportion of CRIM issued to infantry (P. Babcock, HQ Field Force Command, pers. comm., 1985). Average age and years of service were similar for all groups.

Comments obtained in the field were recorded and a list of the most common comments is shown in Annex A.

2. Discards (Q.1)

A total of 83% of respondents discarded at least one item. The 10 most commonly discarded food items, with the percentages of soldiers who discarded those items are shown in Table 2.

TABLE 2: Most commonly discarded items.

Item	Percentage Discarded
Butter Concentrate	7
Butterscotch	7
Cereal Block	6
Biscuits Survival	4
Corned Beef	3
Luncheon Meat Type I	2
Luncheon Meat Type II	2
Potato and Onion Powder	2
Rice	2
Curry Powder	2

* In this paper, reference to a 'percentage' of soldiers is to that percentage of the entire sample (641 soldiers) unless otherwise specified.

3. Extras (Q.3)

Table 3 shows the most common non-ration pack items taken into the field and percentage of soldiers taking each item.

TABLE 3: Most popular non ration pack items.

Non Ration Pack Item	Percentage of Soldiers Taking that Item
Noodles	6
Baked Beans	4
Soup	4
Herbs/Spices/Sauces	4
Sweet/ Lollies	4
Meat or Meat and Vegetables	4
Milo/Drinking Chocolate	3
Spaghetti or other Pasta	3
Dried Fruit	1

4. Spreads (Qs. 4 and 5)

Figure 1 shows the distribution of frequency of consumption of cheese, jam and butter concentrate.

CHEESE

Responses	Percent
No answer	0.6
Never	4.8
Rarely	3.3
Sometimes	6.4
Often	9.4
Always	75.5

JAM

Responses	Percent
No answer	0.8
Never	8.1
Rarely	12.5
Sometimes	27.8
Often	15.3
Always	35.6

BUTTER CONCENTRATE

Responses	Percent
No answer	0.9
Never	51.6
Rarely	23.1
Sometimes	14.7
Often	5.2
Always	4.5

FIGURE 1: Frequency of consumption of the spreads.

Table 4 shows the most common reasons for not eating butter concentrate (least acceptable spread) and jam (of variable acceptability) and most commonly suggested changes:

TABLE 4: Reasons for not eating butter concentrate and jam, and suggested changes.

Item	Reason	Percentage Giving that Reason	Suggested Alteration	Percentage Suggesting Alteration
Butter Concentrate	Dislike	23	Some other spread, e.g. vegemite, peanut butter, honey	12
	Useless	14	Delete	9
	Off Flavours	5	Better Product	8
Jam	Dislike	4	Vegemite	5

5. Biscuits/Cereals (Q. 6, 7 and 8)

Figure 2 shows the frequency distributions for consumption of rice, potato and onion, cereal block, ration biscuits and shortbread biscuits.

In total, 88% of respondents wanted changes made to the biscuits. The most common changes and percentages of respondents wanting those changes are shown in Table 5.

TABLE 5: Most common suggested changes to biscuits.

Change	Percentage Agreeing
More variety	76
More sweet biscuits	61
Delete cereal block	48

In reply to the question "Are you satisfied with the potato and onion powder and the freeze dried rice?", 61% of respondents replied "no". The only change to which a majority (74%) agreed was "make use of noodles."

FREEZE DRIED RICE

Responses	Percent
No answer	0.9
Never	14.2
Rarely	11.9
Sometimes	22.0
Often	18.6
Always	32.4

POTATO & ONION POWDER

Responses	Percent
No answer	1.6
Never	20.1
Rarely	12.6
Sometimes	26.3
Often	19.0
Always	20.4

CEREAL BLOCK

Responses	Percent
No answer	1.1
Never	35.3
Rarely	12.6
Sometimes	14.2
Often	13.3
Always	23.5

SURVIVAL BISCUITS

Responses	Percent
No answer	1.1
Never	15.1
Rarely	14.8
Sometimes	16.5
Often	18.9
Always	33.5

SHORTBREAD

Responses	Percent
No answer	1.1
Never	4.7
Rarely	6.4
Sometimes	14.5
Often	18.1
Always	55.2

FIGURE 2: Frequency of consumption of freeze-dried rice, potato and onion powder and the biscuits.

6. Beverages/Soups (Q. 9-15)

The drinks most commonly consumed at home were fruit juice (85% of respondents) and chocolate drink (81%). These compare with coffee (76%) and tea (67%).

Drinks currently supplied in CRIM were acceptable to 49% of respondents. Least acceptable was beverage base powder, specifically identified as unacceptable by 10%. Table 6 shows the most common reasons given for disliking beverage base powder.

TABLE 6: Most common reasons for disliking beverage base powder.

Reason	Percentage
Dislike flavour	4
Makes you thirsty	2
Bitter	1
Salty	1

Milk, sweetened condensed was considered suitable by 93% of our sample. 58% wanted more.

Extra brews were required by 66% of respondents. The main extras required and percentages wanting more of those brews were:

Coffee (21%);

Tea (16%);

Milo/Choc Drink (10%).

Soup powders were used by 66% of respondents. The most common reason given for not using them was: 'Too thin' or 'weak' (11%).

7. Sundries (Q. 16 and 17)

Figure 3 shows the frequency distributions for adequacy of quantity of sugar, salt and curry powder.

SUGAR

Responses	Percent
No answer	2.3 =
Too little	14.7 =====
Enough	55.7 ====== ====== ======
Too much	27.3 ====== ======

SALT

Responses	Percent
No answer	3.3 =
Too little	3.6 =
Enough	62.7 ====== ====== ======
Too much	30.4 ====== ======

CURRY POWDER

Responses	Percent
No answer	3.3 =
Too little	10.3 ===
Enough	61.3 ====== ====== ======
Too much	25.1 ====== ======

FIGURE 3: Frequency distribution of the user assessment of the quantity of sugar, salt and curry powder.

A total of 82% of respondents would like to see other condiments added. Table 7 shows the most commonly suggested condiments.

TABLE 7: Most commonly suggested additional condiments.

Condiment	Percentage Suggesting Condiment
Garlic Powder	31
Tomato Paste	22
Chilli Powder	6
Tomato Sauce	6

8. Confectionery (Qs. 18 and 19)

Figure 4 shows the frequency distributions for consumption of chocolate, butterscotch and chewing gum.

CHOCOLATE

Responses	Percent
No answer	1.3
Never	2.5
Rarely	5.3
Sometimes	11.2
Often	10.9
Always	68.8

BUTTERSCOTCH

Responses	Percent
No answer	1.6
Never	34.6
Rarely	20.9
Sometimes	21.1
Often	7.2
Always	14.6

CHEWING GUM

Responses	Percent
No answer	1.6
Never	8.1
Rarely	7.8
Sometimes	13.4
Often	14.5
Always	54.6

FIGURE 4: Frequency of consumption of the confectionery items.

'Dislike' was the most common reason for not eating these items. The percentage of soldiers disliking each confectionery item was:

Chocolate 3;

Butterscotch 22;

Chewing gum 5.

A majority of respondents (88%) would like to see changes made to the confectionery. Suggested changes and percentages of respondents agreeing are shown in Table 8:

TABLE 8: Suggested changes to confectionery.

Suggested Change	Percentage
More variety	79
Less butterscotch	56
More chocolate	56
Dark chocolate	44

9. Canned Meats (Qs. 20 to 22).

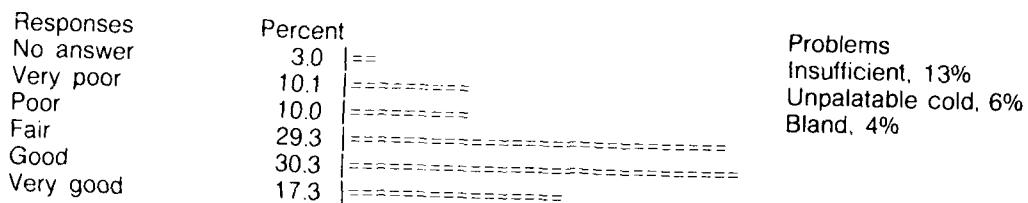
Figure 5 shows the frequency distributions for acceptability of the main meal items. Beside the bar graph for each meal is a list of the 3 most common 'problems' described for that meal and the percentage of respondents who encountered each problem.

Altogether, 71% of respondents considered that too much use was made of beef. The most common suggested alternatives to beef are shown in Table 9:

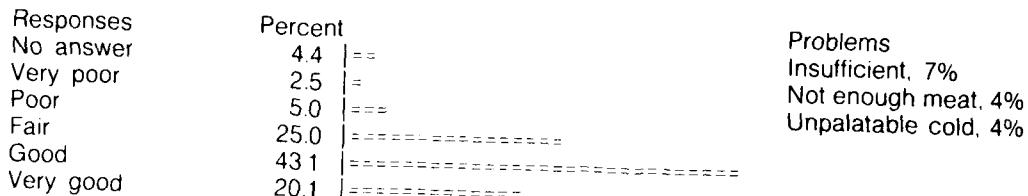
TABLE 9: Suggested alternatives to beef.

Suggested Change	Percentage
Some Chicken	78
Pork Sausages	52
Fish or Seafood	10

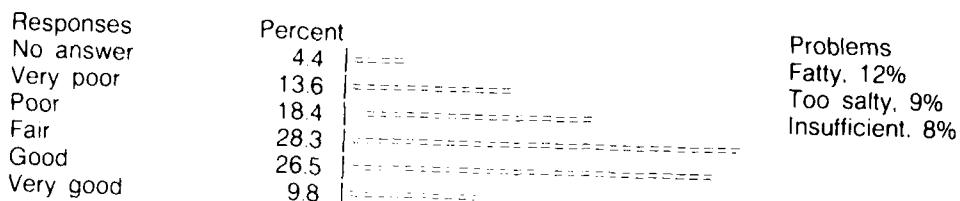
HAM AND EGGS



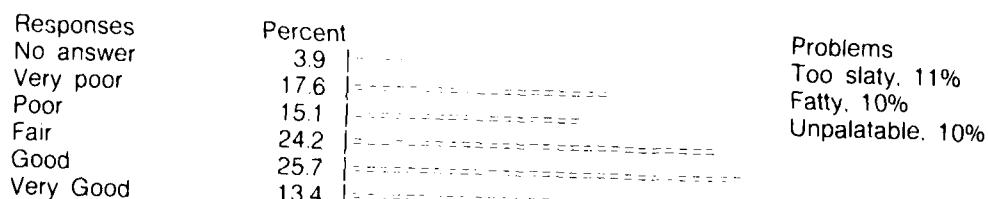
BEEF AND VEGETABLES



PORK AND BEANS



CORNED BEEF HASH



LUNCHEON MEAT TYPE II

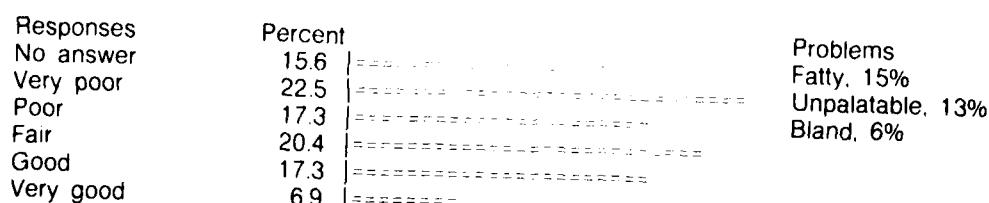
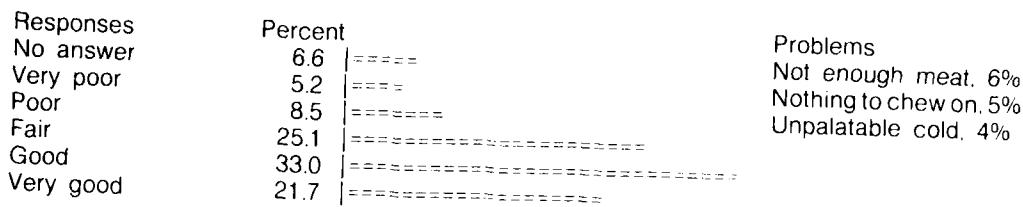
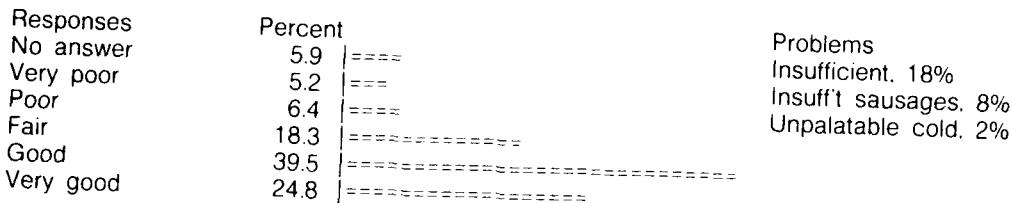


FIGURE 5: Acceptabilities of Main Meal Items and Problems with these Items.

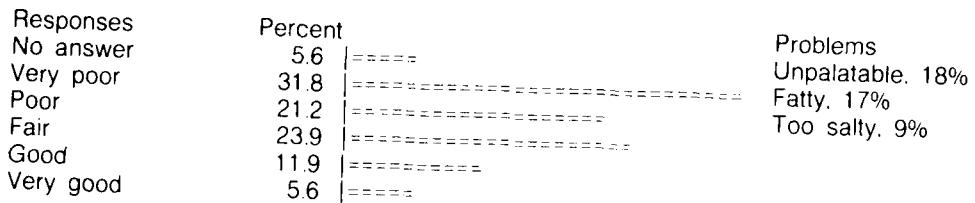
BEEF WITH GRAVY



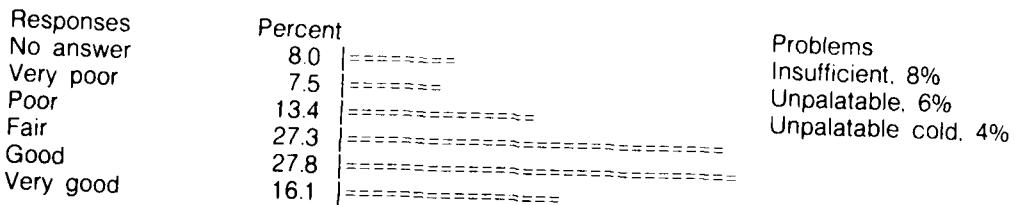
SAUSAGES AND VEGETABLES



LUNCHEON MEAT TYPE I



BEEF AND EGG



CORNED BEEF

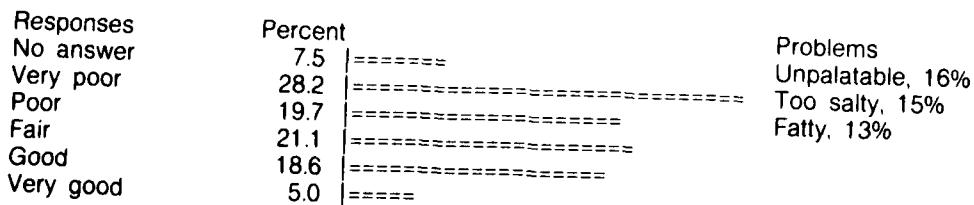


FIGURE 5: continued.

10. Canned Fruit (Qs. 23 and 24):

Figure 6 shows the frequency distributions for flavour of peaches, pears and two fruits.

PEACHES

Responses	Percent
No answer	3.4
Very poor	.9
Poor	.9
Fair	3.6
Good	20.0
Very good	81.1

PEARS

Responses	Percent
No answer	3.4
Very poor	16.3
Poor	1.9
Fair	5.6
Good	18.6
Very good	71.1

TWO FRUITS

Responses	Percent
No answer	3.6
Very poor	1.6
Poor	1.3
Fair	5.9
Good	17.0
Very good	70.7

FIGURE 6: Frequency distribution of user assessment of fruit flavour.

A majority of respondents (75%) would alter the fruit. The most frequently suggested changes are shown in Table 10.

TABLE 10: Suggested changes to canned fruit.

Suggested Change	Percentage
Increase can size	73
Greater variety of fruit	58
Use instant puddings	51
Replace some cans with dried fruit	42

11. General (Qs. 25 to 30)

There is enough total food in each ration pack according to 45% of our sample; 74% considered the packaging suitable.

Most common suggestions for improving the packaging were:

Press seal for outer plastic bag (5%);

Reduce total quantity of packaging (3%).

Toilet paper was regarded as satisfactory by 56% of respondents; 21% wanted more toilet paper.

12. Salt Levels in the CRIM

A total of 142 Infantry (31%) reported at least one main meal item as "too salty". The percentages reporting specific items as "too salty" were: Corned beef — 17; Pork and Beans — 12; Corned Beef Hash — 10; Luncheon Meats — 10. All other main meals were rated as "too salty" by 1-6% of Infantry.

B. Difference Between Groups

Table 11 shows the results obtained for questions 1, 11, 14 and 27 for each group.

TABLE 11: Comparison of Groups for questions which involve quantity of food: "Y" = Yes; "N" = No.

	1 RAR		5 / 7 RAR		SERVICE CORPS	
	Y	N	Y	N	Y	N
Q 1 Discarded Items	228	18	145	15	156	14
Q 11 Sufficient Milk	130	127	66	123	67	119
Q 14 More Brews	150	101	136	44	135	46
Q 27 Enough Total Food	140	94	65	97	82	102

Chi-square analysis of the results for each of the questions 1, 11, 14 and 27 revealed:

(i) No significant difference ($p > 0.05$) between groups with respect to discards;

(ii) Significant difference ($p < 0.01$) for questions 11, 14 and 17.

Further analysis showed that results for questions 11, 14 and 17 from 5 / 7 RAR and Service Corps were virtually identical. A significantly larger proportion of those groups wanted more condensed milk, brews and total food than did 1 RAR.

Even so, 60% of 1 RAR wanted more brews, 50% wanted more condensed milk and 40% wanted an increase in total food.

Table 12 shows the percentages of respondents from each group who identified "insufficient quantity" as a problem with main meal items.

TABLE 12: Percentage of soldiers from individual groups who identified "insufficient quantity" as a problem with meat packs

	1 RAR	5/7 RAR	SERVICE
Ham and Eggs	13	13	13
Beef and Vegetables	4	5	10
Pork and Beans	8	6	9
Corned Beef Hash	2	1	3
Luncheon Meat Type II	5	1	2
Beef with Gravy	2	3	5
Sausages and Vegetables	25	13	13
Luncheon Meat Type I	2	0	1
Beef and Egg	8	6	6
Corned Beef	1	1	4

Analysis of variance showed no significant difference between groups with respect to quantity of main meal items ($p > 0.05$).

DISCUSSION

Despite previous recommendations for significant alterations (Badcock & Lichtenstein, 1978 Lichtenstein, 1979), the CRIM has remained essentially the same for many years. The results of this survey bear a striking resemblance to those reported 8 years ago. Many of the same food items are still of low acceptability usually for the same reasons.

The points made in the following discussion were used to produce the revised menu sheet in Annex B.

1. Discards (Q. 1)

The relatively high discard rates for butter concentrate, butterscotch, cereal block, biscuits survival, corned beef and the two luncheon meats (Table 2) reflect their low acceptability in the field. The lack of a significant difference in discard rates between groups suggests that access to transport and non ration pack items, commonly called "Jack rations", does not strongly influence a soldier in his choice of ration pack items for use in the field. If he dislikes an item, he will discard it.

2. Extras (Q. 3)

Only 47% of respondents claimed to take extras. The subjective impression of the observer (C.F.E.) is that the vast majority, perhaps all of the soldiers take non-ration pack foods into the field. Therefore the frequencies reported are likely to be much lower than the actual frequencies of extras taken. Nevertheless, the popularity of items such as noodles, baked beans, spices/sauces, pasta and dried fruit is clear from Table 3.

3. Spreads (Qs. 4 and 5)

Figure 1 shows that butter concentrate is of very low acceptability; 75% of our sample rarely or never use it. It was also the most commonly discarded item (Table 2). These results and those for question 5 (see Table 4) suggest that a greater variety of spreads would improve the overall acceptability of the pack. Vegemite, honey and peanut butter are all potential additional spreads. The ideal situation would be a different spread in each pack. The appeal of a variety of spreads was noted by Badcock and Lichtenstein (1978).

4. Biscuits/Cereals (Qs. 6, 7 and 8)

Figure 2 shows that rice and potato & onion powder are of moderate acceptability. Many soldiers also take flavoured noodles (e.g. Maggi 2 minute noodles) into the field. Seventy-four per cent of respondents to this questionnaire want the ration to include noodles. This high frequency suggests that an appropriate breakdown of menus might be 2 rice: 1 potato & onion: 2 noodles.

Cereal block was the least popular biscuit, being 'never' or 'rarely' eaten by 49% of respondents. It was the third most commonly discarded item behind butter concentrate and butterscotch. Badcock and Lichtenstein (1978) reported similar results.

Ration biscuits were of fair acceptability and shortbread biscuits were quite popular.

Table 5 shows that a greater variety of biscuits and more sweet biscuits are needed. From discussions with groups of soldiers, it also became evident that muesli bars would be popular. Badcock and Lichtenstein (1978) also recommended that a survey of a variety of biscuits be made to determine which biscuits are suitable as CRIM items.

A variety of sweet biscuits such as currant luncheon, jam fancy, butternut snap and ginger snap, if shelf-stable, is preferable to shortbread alone.

A common suggestion from the field was that dry, 'cracker' biscuits would be acceptable. These could be eaten with the cheese, soup or a savoury spread such as vegemite. A similar quantity to survival biscuits (42 g) would be appropriate.

5. Beverages/Soups (Qs. 9 to 15)

The main points of discussion in relation to the drinks are the low acceptability of beverage base powder and the popularity of chocolate drinks. In view of the 85% frequency of use of fruit juice at home, a fruit flavoured drink powder would seem to be appropriate. The current beverage base powder is unpopular and should be reformulated. Badcock and Lichtenstein (1978) made the same recommendation.

Currently, 14 g of beverage base powder is provided: flavours are orange, lemon and lime. This is enough to make one canteen cup of reconstituted drink (about 600 mL), but not enough to fill a water bottle (1 L). Perhaps a better arrangement would be 2 x 10g powder, allowing the user to three-quarters fill a canteen cup twice or fill one water bottle. This would also permit a greater variety of flavours to be used. The menu breakdown could be similar to the following:

A	B	C	D	E
Orange Orange Mango	Pineapple Orange	Lemon Lime	Blackcurrant Apple	Orange Orange/Passionfruit

The inclusion of a chocolate drink, such as Milo or Ovaltine would also be very well accepted, as noted by Badcock and Lichtenstein (1978). About 30g Milo:milk powder = 1:1 makes a suitable drink when reconstituted with hot water.

All groups agreed that more brews were required (Table 11). The significantly lower proportion of 1 RAR wanting more brews probably reflects their greater concern for minimising weight and bulk as they rarely have access to motorised transport.

Sweetened condensed milk is suitable but the quantity needs to be increased (Table 11). This is especially the opinion of 5/7 RAR and service corps. About 50% of 1 RAR also wanted more milk. An increase from 71g to 85g may be sufficient.

The soups are quite popular as gravy base, but many soldiers describe them as 'thin' or 'weak' when used as a soup. A reformulation, increase in quantity or substitution with stock cubes may be necessary to produce an item suitable for drinking as a soup. A wider variety of soups is needed, e.g. tomato, pea and ham and mushroom. The revised menus at Annex B have 10 g soup powder, instead of the current 6.5 g.

6. Sundries (Qs. 16 and 17)

Figure 3 shows that the quantities of sugar, salt and curry powder are adequate. There is a strong desire for more flavouring agents — herbs, spices and sauces (Table 7). These would allow the soldier to reduce the monotony inherent in a choice of only 10 main meal items. Garlic, chilli, mustard, tomato sauce, Worcestershire sauce and tabasco sauce are all popular. The widest possible use of these condiments should be made, subject to weight and space limitations. Badcock and Lichtenstein (1978) made a similar recommendation.

Some thought needs to go into choosing appropriate condiments for each menu. As examples, mustard would be suitable with ham; tomato sauce or Worcestershire sauce might accompany a meat pack such as Beef & Gravy and curry powder is appropriate for beef and vegetables.

7. Confectionery

Figure 4 shows that chocolate and chewing gum are acceptable. However, Table 8 reveals a strong desire for a wider variety of confectionery items. Dark chocolate would be equal in popularity to the currently used light chocolate. It could be used in several menus or perhaps the two chocolates could be used in alternate years. Chewing gum should be of several varieties and many soldiers would like an increase in quantity. Additional flavours could include 'Stimorol' which comes in packets of 10 pellets. Lichtenstein (1979) also noted a desire for a variety of chewing gum.

Butterscotch is generally unpopular, at least in the quantity presently provided. It is the second most commonly discarded item after butter concentrate. There are 9 pieces of butterscotch in each pack of CRIM. A soldier living on CRIM for 7 days (the maximum period allowable in peace time) receives 63 pieces of butterscotch. It is understandable that many soldiers become 'sick of them'. A variety of sweets was desired by 79% of our sample — barley sugar, boiled candy, glucose sweets, fruit drops and lifesavers are potential ration pack confectionery items. Lichtenstein (1979) commented on the likely popularity of a variety of sweets. It is also suggested that the quantity be reduced by one-third, e.g. to 6 pieces (34g) butterscotch or other sweet or to 1 packet (20g) lifesavers.

8. Canned Meats (Qs. 20 to 22)

Among the main meal items, Luncheon Meats I and II and Corned Beef are of low acceptability (Figure 5). Badcock and Lichtenstein (1978) also reported that these were the main meal items of lowest acceptability.

Corned Beef Hash and Pork & Beans are of marginal acceptability. All other main meal items are of adequate acceptability although suffering from some problems. Ham & Egg and Beef & Egg develop a 'burnt' flavour when heated in the can. Ham & Egg, Beef & Egg, Beef & Gravy and Sausages & Vegetables are not very palatable when eaten cold. The provision of herbs and spices may help to reduce the extent of the problems.

There is a demand by all groups for larger breakfast meals. Table 12 shows that Sausages & Vegetables and Ham & Egg in particular are considered to have "insufficient quantity". To a smaller extent, the same comment applies to Beef & Egg and Pork & Beans. Of the breakfast meals only Corned Beef Hash is not required in greater quantity, reflecting its marginal acceptability. An increase from the current average of about 110g to 150g should be enough.

Too much use is made of beef; Table 9 shows that acceptable alternatives to beef include pork, chicken and fish. Badcock and Lichtenstein (1978) reported requests for fish, chicken, turkey, baked beans and spaghetti. As salmon and tuna are canned in Australia, fish could be included in one menu, for example in menu E instead of Corned Beef to increase the variety of main meals. Spaghetti and baked beans are common "Jack rations" and would be popular as breakfast items. Chicken or turkey, leg ham, braised steak and onions are all acceptable alternatives to the items recommended for deletion.

There is a requirement for additional menus of CRIM, ultimately 15 menus are needed. Some of the meals recommended for deletion may, with reformulation, be used in these additional menus. Corned Beef of improved quality, luncheon meats with less fat and salt, and Corned Beef Hash with less salt are likely to be of satisfactory acceptability, particularly if they do not appear in the field for several years. Lamb, turkey, pork sausages, "ethnic" meals, e.g. Chinese, are potential items for additional menus.

9. Canned Fruits (Qs. 23 and 24)

Canned fruit is very popular. Nearly three-quarters of our sample would like to see an increase in the quantity of canned fruit (Table 10).

A majority would also like to see a greater variety of fruits, for example, a different fruit in each menu. An alternative would be the use of instant puddings (favoured by half our sample) in one or two menus, instead of canned fruit.

A new product with potential as a ration pack dessert is freeze dried yogurt. This is being developed at AFFSE and, if storage-stable, would be an alternative to canned fruit and instant puddings. A breakdown of the five menus such as fruit; pudding; fruit; pudding; yogurt (see Annex B) would increase the variety of CRIM. Instant puddings and freeze dried yogurt have two advantages over canned fruit — less weight and bulk and higher energy content.

The suggestion that dried fruit might replace some canned fruit (Q. 24) was supported by only 42% of our sample. However, as an additional item, or perhaps in some menus as a substitute for sweets or for cereal block, dried fruit would be popular. The revised menu list at Annex B shows dried fruit in 3 menus. Lichtenstein (1979) also reported a demand for dried fruit. Dried apple, raisins or sultanas and dried apricots, if found to be shelf-stable, would be appropriate.

10. General (Qs. 25 to 30)

Overall opinion was evenly divided on the adequacy of total food in each pack. A clear majority (60%) of 1 RAR was satisfied with the present quantity (Table 11). Conversely, 58% of 5/7 RAR and service corps wanted more food. This difference almost certainly reflects the concern of the foot-soldier (not shared by mechanised infantry or Service Corps) with weight of equipment carried on the soldier's person. In this respect, the opinion of the foot-soldier must prevail and an increase in total weight of food is not recommended.

Most soldiers were satisfied with the packaging. The most common suggestion for improvement — a resealable outer plastic bag — seems sensible. Other common suggestions were: use square cans; use aluminium cans; use water proof plastic outer for tea bags. The practicality of square and/or aluminium cans is doubtful.

Of the non-food items, matches were most often criticized. A box of 48 matches was considered wasteful, both of matches and of space. A booklet of 15 or 20 matches would be less likely to disintegrate, less wasteful and use less room.

The spoon-opener needs to be about 3 cm longer, so the soldier can stir a full canteen cup and reach to the bottom of the large main meal can. Alternatively, a 13 cm plastic spoon could be added to the pack.

Although one fifth of respondents wanted more toilet paper, our impression is that 10 sheets are adequate: constipation, not diarrhoea, seems to be the main problem with regard to bowel function in the field.

One common criticism from the soldiers was that the supply system often fails to provide a variety of menus. One experienced sergeant at 1 RAR claimed to have had only CRIM Type E for 16 days. One means of overcoming this problem is to put one pack of each menu in the intermediate container when the ration packs are being assembled. This would have the added advantage of allowing soldiers greater scope to exchange items when the packs are issued. This would be especially important if many of our recommendations to increase variety in the CRIM are carried out. Thus the soldier who prefers vegemite could exchange his honey or peanut butter for it; baked beans could be exchanged for spaghetti and so on.

As a general observation, CRIM items seem to be close to the end of their storage life when issued. All items with date marks were more than two years old when eaten at Townsville or Puckapunyal. The acceptability of CRIM would be improved immensely if the delay between manufacture of components and issue of packs could be halved. Storage trials conducted at AFFSE have shown that foods stored for 12 months are of much greater acceptability than those same foods stored for 2 years, particularly at the high ambient temperatures which prevail in Australia.

Perhaps at times when there is 'no perceived threat' to Australia's security, turnover time for ration packs could be one year. If a threat is identified, either in the short or long term, Logistics Command could revert to the two year turnover time, thus creating a reserve of ration packs. The reduction in turnover time, if feasible, would allow a greater range of items to be used in CRIM. Many acceptable nutritious foods are currently unsuitable as ration pack items because they are not shelf stable for 2 years. The ultimate aim of 15 menus of CRIM is more likely to be achieved with a turnover time of 12 months than with the current 2 years.

There is currently no information on the nutrient content of items on the contents/instruction sheet. If some nutritional information were provided to the user, he would be in a better position to make ration discards if space for stowage of foods is minimal. Such information has been collated at AFFSE and it could be included on the contents/instruction sheet. An example is shown at Annex C. As the instructions for use are on the packaging of each item, the information at Annex C could replace the current "Instructions For Use".

The high rate of discards and exchanges, revealed in this survey, suggest that many soldiers do not receive the balanced intake of nutrients provided by CRIM. An education programme on the importance of sound nutrition to fitness, mental alertness and long-term health may help to overcome this problem. The obvious time to commence this education is when the soldier joins the Army. Instruction in sound nutrition, the nutritional design of ration packs and their proper use should become an integral part of recruit training.

There is a perceived requirement for more than 5 menus of CRIM. Many soldiers commented that 10-15 menus, with few common items, would provide adequate variety no matter how long the field exercise or period of combat. It is strongly recommended that work on development of new menus be continued. The current concept of a total of 15 menus with rotation so that 5 menus are used each year is less satisfactory than having all 15 menus available at once. However, the use of 5 menus at a time, with rotation, may be more practicable because of difficulties in procurement of the necessarily smaller quantities.

Another way of increasing variety in field feeding would be to make greater use of Patrol Ration One Man (PRIM). This is lighter than CRIM (about 800g compared to 1400g) and is ideally suited to use in areas where water is readily available. There is negligible cost difference between CRIM and PRIM.

Effects of the Recommendations on Weight and Energy Content of CRIM

Table 13 shows the weight of food and energy content of each current and revised menu of CRIM.

TABLE 13: Weight and energy content of current and revised CRIM

MENU	(Net) Weight (g)		Energy Content (kJ)	
	Current	Revised	Current*	Revised*
A	1160	1220	13050	13400
B	1160	1115	12950	13500
C	1160	1210	13750	13050
D	1160	1170	13550	13500
E	1170	1090	13950	13100

* Calculated from James et al. 1984.

* Calculated from Paul & Southgate (1979), James et al (1984) and Thomas & Corden (1977).

The proposed changes will have little effect on weight of food.

It is evident that the proposed changes would not reduce available energy on average. However, the unpopular items — butter concentrate, luncheon meats I & II and corned beef — account for more than 1000 kJ per menu. As these items are discarded, never or rarely eaten by up to 75% of users, the actual energy intake of soldiers eating revised CRIM will probably be higher than it is now.

CONCLUSIONS

The CRIM is overdue for an extensive overhaul. The almost universal complaint from the field is that the ration packs are boring and lack variety. Some items, which were shown to be unacceptable 8 years ago, are still in the CRIM and are still unacceptable.

The recommendations of this report should, if carried out, lead to a ration pack which is nutritionally sound and acceptable to the Australian soldier. Annex B shows sample revised menus of CRIM incorporating these recommendations.

RECOMMENDATIONS

A menu listing based on these recommendations is shown at Annex B.

- (i) Delete butter concentrate (sections 1 and 3 of Discussion).
- (ii) Use a variety of spreads, e.g. jam, honey, vegemite, lemon spread, peanut butter (section 3).
- (iii) Use noodles in some menus instead of rice or potato & onion powder (section 4).
- (iv) Use dried fruit and muesli bars as alternatives to cereal block in three menus (sections 4 and 9).
- (v) Use a variety of sweet biscuits, e.g. jam fancy, currant luncheon, butternut snap, rather than shortbread in each menu (section 4).
- (vi) Introduce cracker biscuits, suitable for consumption with vegemite, cheese or soup (section 4).
- (vii) Reformulate beverage base powder. Increase range of flavours and increase quantity from 1 x 14 g to 2 x 10 g (section 5).
- (viii) Include a chocolate drink such as Milo in each pack (section 5).
- (ix) Increase quantity of sweetened condensed milk from 71 g to 85 g (section 5).
- (x) Increase quantity of soup from 6.5 g to 10 g. Increase the variety of soups to include, e.g. tomato, mushroom, pea & ham.
- (xi) Spices and sauces should be added. Garlic, chilli, mustard, pepper and tomato sauce are likely to be the most popular additional condiments (section 6).
- (xii) Increase the variety of confectionery — fruit drops, lifesavers, boiled candy, glucose sweets and barley sugar are appropriate. A different sweet in each menu is needed. The quantity should be reduced from 50 g to about 34 g (section 7).
- (xiii) Chewing gum of different types and flavours should be introduced, e.g. juicy fruit, arrowmint, PK Blue (4 pellets), spearmint (5 sticks) and Stimorol (10 pellets).
- (xiv) Delete Luncheon Meats I and II, Corned Beef and Corned Beef Hash and Pork and Beans from the current menu lists. Add meals based on pasta, ham, pork, lamb, fish and poultry. The deleted meals, after reformulation, and "Ethnic" meals, e.g. Chinese, may be used in additional menus (section 8).
- (xv) Increase the size of the canned breakfast meal from the current average of 110 g to about 150 g (section 8).
- (xvi) Instant puddings and freeze dried yogurt, if found to be storage stable, should be used to increase the variety of desserts (section 9).
- (xvii) Incorporate a 'snap-lock' reseal in the outer plastic container (section 10).
- (xviii) Pack tea bags in a water proof container (section 10).

- (xix) Replace the box of 48 matches with a booklet of 20 matches. Make the striker waterproof, if possible. Otherwise, pack the booklet in a resealable waterproof container (section 10).
- (xx) Increase the length of the spoon/opener by about 3 cm, or include a 13 cm plastic spoon (section 10).
- (xxi) Investigate the feasibility of including one pack of each menu in the intermediate container of 5 CRIM packs (section 10).
- (xxii) Investigate ways of reducing the time between manufacture of ration pack items and the issue of ration packs. This recommendation is regarded as likely to have the greatest impact on overall acceptability of CRIM (section 10).
- (xxiii) Include nutrition information on the contents sheet (section 10).
- (xxiv) Instruction in the nutritional value and proper use of ration packs should be given to soldiers as part of their recruit training (section 10).
- (xxv) Continue development of additional menus of CRIM. The new menus should consist, as far as possible, of items dissimilar to those in existing menus (section 10).
- (xxvi) Production of Patrol Ration One Man should be increased to allow use of this ration pack in suitable areas (e.g. rainforest) instead of CRIM.

REFERENCES

- Badcock, W. E. (1985), "Field Evaluation of Australian Ration Packs; Combat Ration Ten Man". Armed Forces Food Science Establishment, Scottsdale, Tasmania.
- Badcock, W. E. and Lichtenstein, D. J. (1978), "Field Evaluation of Australian Ration Packs", AFFSE Report 4/78, Armed Forces Food Science Establishment, Scottsdale, Tasmania.
- D.O.D. (1983), Army Staff Requirement (ASR) 69.1 Operational Rations. Department of Defence, Australia.
- D.O.D. (1984), Australian Defence Force Ration Scales and Scales of Issue. SUPMAN 4. Department of Defence, Australia.
- Forbes-Ewan, C. H. (1986), "Salt in Defence Feeding. A Literature Review" Armed Forces Food Science Establishment, Scottsdale, Tasmania.
- James, K. W., Tattersall, P. J., Forbes-Ewan, C. H., Hancock, A. T. and Thomson, G. F. (1984). "Laboratory Evaluation of Australian Ration Packs", Report No. 1/84, Armed Forces Food Science Establishment, Scottsdale, Tasmania.
- Lichtenstein, D. J. (1979), "Field Evaluation of Australian Ration Packs Combat Ration (One Man) 1976/77 Exercise Top Point", AFFSE Report 5/79, Armed Forces Food Science Establishment, Scottsdale, Tasmania.
- Paul, A. A. and Southgate, D. A. T. (1979), "McCance and Widdowson's The Composition of Foods" 4th Ed. Elsevier/North-Holland Biomedical Press: Amsterdam.
- Thomas, S. and Corden, M. (1977) "Metric Tables of Composition of Australian Food", Commonwealth Department of Health, A.G.P.S. Canberra.

MOST COMMON COMMENTS OBTAINED IN THE FIELD

1. The ration still needs to be edible hot or cold.
2. There are too many items common to each menu. Greater variety is needed, examples of how to achieve this are: use five varieties of lolly instead of butterscotch in each menu; 5 varieties of sweet biscuit, not just shortbread, 5 varieties of soup and so on.
3. Sauces and other condiments, e.g. garlic powder, chilli powder and pepper would allow a wider variety of tastes to be created.
4. There is too much beef: chicken and fish are needed to increase variety.
5. A chocolate drink would be popular with the vast majority — the call for Milo was almost unanimous.
6. Muesli bars would be acceptable, perhaps as an alternative to cereal block in some menus. Cracker biscuits would be welcome, perhaps with a variety of flavours.
7. Butter concentrate is usually discarded — many soldiers suggested replacing it with a chocolate milk drink which could be made up with water.
8. Dried fruit, e.g. raisins or dried apricots would be popular, but as an addition to the ration, not as a replacement for canned fruit.
9. Maggi '2-minute noodles' (or similar) are popular because of their low weight and rapid preparation.
10. The meat packs Luncheon Meat Types I and II and Corned Beef Type E are unpopular. Leg ham would be popular as a replacement for one of these.
11. A variety of spreads would be popular — cream cheese, vegemite, honey, peanut butter, lemon spread — instead of jam in every menu.
12. Baked beans and spaghetti would be popular.
13. A book of 20 matches would be more practicable than the current box of about 50. The matches are water-proof but the striker is not.
14. The spoon-opener needs to be longer to reach the bottom of the canteen cup and the main meal cans.
15. Beverage base powder is generally unpopular — not only because of its taste but because it taints the plastic water bottle.
16. Many soldiers would prefer a packet of ten pellets of chewing gum with a different flavoured gum in each menu.
17. To avoid the situation in which a unit receives only one menu for several days, one pack of each menu should be included in the intermediate container.

18. A "snap lock" resealable outer plastic bag should be used.
19. Teabags often rupture, spilling contents. Teabags also need a waterproof overwrap.
20. Sugar in cubes would be preferable to the currently used sugar crystals. The packaging now used is frail and likely to rupture.
21. A refresher towel would be appreciated by many.
22. Cans should be square and preferably lighter — e.g. aluminium — to fit conveniently in the pack.
23. Stock cubes could be used to boost flavour of stews or as a beverage.
24. There should be enough drink powder to provide one drink per sachet — currently the beverage base powder provides more than 1 canteen cup of reconstituted drink. This would also overcome the tainting problem.
25. Toiletries — e.g. disposable razor with soap pad, disposable toothbrush and toothpaste, would all be appreciated.
26. Many soldiers, particularly foot-soldiers, stressed the importance of keeping weight and bulk to a minimum. The CRIM is "already heavy enough".
27. Soldiers who had used the lightweight Patrol Ration One Man (PRIM) all commented favourably on its acceptability and service suitability. Some suggested that a combination of canned and freeze dried pouched meals would be ideal in CRIM. Others were keen to see greater use made of PRIM for field feeding.

SUGGESTED REVISED CONTENTS SHEET, CRIM

A	B	C	D	E
Ham & Egg 150g	Sausages & Vegetables 150g	Spaghetti Bolognase 150g	Baked Beans with Bacon 150g	Tuna in Brine 150g
Jam Apricot 26g	Honey 26g	Vegemite 13g	Jam Peach 26g	Peanut Butter 26g
Curry Powder 3.5g	Mustard 3.5g	Tomato Sauce 3.5g	Curry Powder 10g	Pepper 3.5g
Beef & Vegetables 227g	Leg Ham 227g	Beef & Gravy 227g	Chicken Supreme 227g	Pork & Vegetables 227g
Rice Freeze Dried 55g	Noodles 50g	Noodles 50g	Potato & Onion 50g	Rice Freeze Dried 55g
Peaches 140g	Chocolate Pudding 50g	Two Fruits 140g	Caramel Pudding 50g	Yogurt F.D. 50g
Soup Powder — Mushroom 10g	Soup Powder — Chicken 10g	Soup Powder — Tomato 10g	Soup Powder — Pea & Ham 10g	Soup Powder — Beef 10g
Cereal Block 56g	Sultanas 40g	Cereal Block 56g	Muesli Bars 2 x 30g	Dried Apple 25g
Biscuits Sweet — Currrant Luncheon 85g	Biscuits Sweet — Raspberry Crunch 85g	Biscuits Sweet — Shortbread 85g	Biscuits Sweet — Butternut Snap 85g	Biscuits Sweet — Ginger Snap 85g
Fruit Drink Powder — Orange 10g — Orange/Mango 10g	Fruit Drink Powder — Pineapple 10g — Orange 10g	Fruit Drink Powder — Lemon 10g — Lime 10g	Fruit Drink Powder — Blackcurrant 10g — Apple 10g	Fruit Drink Powder — Orange 10g — Orange/Passionfruit 10g
Jelly Beans 34g	Boiled Candy 34g	Butterscotch 34g	Dried Apricots 40g	Lifesavers 20g
Chewing Gum — Juicy Fruit 4 pellets	Chewing Gum — Arrowmint 4 pellets	Chewing Gum — P.K. 4 pellets	Chewing Gum — P.K. Blue 4 pellets	Chewing Gum — P.K. 4 pellets

The following items are common to all menus:

Biscuits Cracker 42g; Biscuits Survival 1 x 42g; Sweetened Condensed Milk 85g; Milo 30g; Sugar 12 x 7g; Teabags 2 x Nos; Instant Coffee 2 x 3.5g; Chocolate 50g; Cheese 47g; Salt 1 x 7g; Matches 1 book of 20; Can Opener; Rubber Band; Toilet Paper 10 sheets; Pad Scouring with Soap.

NUTRITION INFORMATION FOR REVERSE SIDE OF CONTENTS SHEET**Nutrition Information**

The Combat Ration One Man has been designed to ensure that you receive enough food and vitamins each day. Therefore it is desirable that all food in the pack is eaten. If you find that the pack contains too much food, the following information may help you to decide which items you should retain:

- (i) The chocolate, coffee and biscuits provide most of the vitamin B1 in the pack;
- (ii) Chocolate, coffee, fruit drink powder and jam all have added vitamin C;
- (iii) Chocolate also has added vitamin A.

These are the vitamins which are most likely to be adversely affected by long-term storage of the rations. They are also the vitamins which are most likely to become deficient in your body during long periods away from fresh food supplies. Therefore, if you discard items, you should retain at least some of the fortified components.

Unless you have adequate intake of these vitamins you may lose concentration, become tired easily, lose night vision and your body may lose the ability to heal wounds quickly.

Salt

The amount of salt provided is in excess of normal requirements. However, extra salt is needed by those working hard in a hot environment. This is especially so for soldiers who have recently moved from a cool climate area to a hot environment and who are not yet acclimatised to the heat. In these circumstances, salt losses in the sweat can be massive. The extra salt, if required, should be taken dissolved in a plentiful quantity of drinking water (not more than one quarter of a packet to a full water bottle). Alternatively, the salt can be sprinkled on the food.

It is essential that you drink plenty of water. Heat and exercise cause dehydration **and** loss of thirst. You should drink plenty of water if you are sweating heavily. **even if you don't feel thirsty.**

Water Sterilization

All water supplies in the field must be regarded as contaminated and should be sterilized before drinking by:

- a. Boiling, or
- b. Use of water sterilizing tablets.

Tea, coffee or beverage base powder must not be added until at least 30 minutes after the water sterilizing tablet has been added. Addition of any of these drinks will completely destroy the sterilizing agent which needs 30 minutes to kill germs.

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MOD Reference Services Medical Directorate (EMR 2) First Avenue House High Holborn LONDON WC1V 6HE United Kingdom	1	(a) D Food S (b) DCGEM 3 (Attention J P Kroepelin) (c) NDHQ Main Library	1 1 1
A Org & Sec (HF) Room 7196 Ministry of Defence Main Building Whitehall LONDON SW 1A2HB United Kingdom	1	SRI LANKA Director Food Research and Nutrition Council C/- Food Commissioner Union Place COLOMBO Sri Lanka	1
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Mr G Ford Librarian Leatherhead Food R A Randalls Road LEATHERHEAD Surrey KT227RY United Kingdom	1	GHANA Defence Adviser Ghana High Commission 13 Belgrave Square LONDON SW1X 8PR United Kingdom	5
Librarian Food Research Institute Colney Lane Norwich NORFOLK NR4 7UA United Kingdom	1	INDIA Director General Research and Development Organisation Ministry of Defence NEW DELHI 11 India	2
Superintendent Foods and Nutrition Division Laboratory of the Government Chemist Cornwall House Stamford Street LONDON SE1 9NQ United Kingdom	1	Director Defence Food Research Laboratory Jyothinagar MYSORE 570 010 India	2
Librarian ARC Meat Research Institute Langford BRISTOL BS18 7DY United Kingdom	2	MALAYSIA Director Defence Research Centre Ministry of Defence Rifle Range Road KUALA LUMPUR Malaysia	3
Mr S Reynolds Food Science Laboratory - MAFF 65 Romney Street LONDON SW1 United Kingdom	1	NEW ZEALAND Assistant Chief Defence Staff Defence Headquarters Private Bag WELLINGTON New Zealand	1
Library Tropical Development & Research Institute 56-62 Gray's Inn Road LONDON WC1X 8LU United Kingdom	1	DTMC RNZCT Directorate Army General Staff Private Bag WELLINGTON New Zealand	2

OVERSEAS ESTABLISHMENTS Cont'd	No OF REPORTS
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1

ARMED FORCES FOOD SCIENCE ESTABLISHMENT
COMBAT RATION ONE MAN USER QUESTIONNAIRE

The following survey attempts to find out what you think about the Combat Ration One Man. This questionnaire contains four styles of question described below.

1. The 'rating scale' contains a series of descriptive words. The question is answered by drawing a circle around the word that best fits your answer. For example:

"After a field exercise, do you drink beer":

ALWAYS OFTEN SOMETIMES RARELY NEVER ?*

This means that you usually drink beer but not always.

2. The simple YES/NO question, where you circle the answer you agree with.

3. The checklist gives a series of possible answers. You place a tick in the box beside each answer you agree with. For example:

"I drink beer because:

IT TASTES GOOD	[<input checked="" type="checkbox"/>]
IT IS REFRESHING	[<input checked="" type="checkbox"/>]
MAKES ME FEEL GOOD	[<input checked="" type="checkbox"/>]
MAKES ME A DRUNK DRIVER	[<input type="checkbox"/>]*

This indicates that you drink beer because it is refreshing, tastes good and makes you feel good, but not because it makes you a drunk driver.

4. The final type of question asks you to give a simple written answer to the question. This is identified by a line.

Please don't hesitate to give your real opinion as the results of the survey will assist us in improving the ration for you the user.

Even if you have not eaten the Combat Ration One Man for some time, you may be able to fill in this questionnaire if you are familiar with it from previous exercises. You may disregard questions about items you cannot remember eating. Page 12 shows the contents of all five menus of the Combat Ration One Man.

CORPS _____

ARA/Ares (circle correct answer)

AGE _____

Time since last used
Combat Ration One Man

YEARS OF SERVICE _____

months

1. Do you usually discard any items?

(circle your answer) YES/NO

If 'YES', please indicate which items you discard and why.

Item: _____ Reason: _____
Item: _____ Reason: _____

2. Do you usually exchange any items with other soldiers?

(circle your answer) NO/YES

If 'YES', which items do you exchange?

Item: _____ Exchanged for: _____
Item: _____ Exchanged for: _____
Item: _____ Exchanged for: _____
Item: _____ Exchanged for: _____

3. What other foods (not from the Combat Ration One Man) do you take?

SPREADS

4. Indicate below how often you eat the following items from the Combat Ration One Man, when in the field, by circling the appropriate answer.

CHEESE ALWAYS OFTEN SOMETIMES RARELY NEVER

JAM NEVER RARELY SOMETIMES OFTEN ALWAYS

BUTTER CONCENTRATE ALWAYS OFTEN SOMETIMES RARELY NEVER

5. For those spreads that you never or rarely eat, please indicate the reasons for not using them and any changes that would encourage you to use them.

a) ITEM: _____ REASON: _____

SUGGESTED CHANGE: _____

b) ITEM: _____ REASON: _____

SUGGESTED CHANGE: _____

c) ITEM: _____ REASON: _____

SUGGESTED CHANGE: _____

 BISCUITS/CEREALS

6. Indicate how often you eat the following items in the field
(circle your answer):

RICE FREEZE-DRIED ALWAYS OFTEN SOMETIMES RARELY NEVER

POTATO AND ONION NEVER RARELY SOMETIMES OFTEN ALWAYS

CEREAL BLOCK ALWAYS OFTEN SOMETIMES RARELY NEVER

RATION BISCUITS NEVER RARELY SOMETIMES OFTEN ALWAYS

SHORTBREAD ALWAYS OFTEN SOMETIMES RARELY NEVER

7. Should there be changes to the biscuits?

(circle your answer)

YES/NO

If "YES" which of the following changes would you prefer
(tick all appropriate boxes)?

MORE SWEET BISCUITS []

DELETE CEREAL BLOCK []

MORE VARIETY []

MORE SHORTBREAD []

LARGER CEREAL BLOCK []

OTHER (please describe):

8. Are you satisfied with the potato and onion powder and the freeze dried rice?

(circle your answer):

NO/YES

If 'NO', which of the following changes would you make (tick all you agree with)?

DELETE POTATO AND ONION POWDER []

MORE RICE []

BROWN RICE []

DELETE RICE []

MAKE USE OF NOODLES []

OTHER (Please describe):

BEVERAGES/SOUPS

9. Tick those of the following that you drink at home.

TEA []

COFFEE []

CHOCOLATE e.g. 'MILK', 'OVALTINE'

MILK ()

FRUIT JUICE ()

CORDIALS

OTHER (Please describe):

10. Are the drinks currently supplied in the ration acceptable to you?

(circle your answer) YES/NO

If "NO", which ones are not acceptable and why?

Drink: _____ Reason: _____

Drink: _____ Reason: _____

Drink: _____ Reason: _____

11. Is there sufficient condensed milk?

(circle your answer) NO/YES

12. Is the condensed milk suitable?

(circle your answer) YES/NO

13. Would you prefer other drinks to those supplied?

(Circle your answer)

NO/YES

If 'YES', which drinks would you replace?

Drink: _____ Replaced with: _____

Drink: _____ Replaced with: _____

14. Do you require more brews?

(circle your answer)

YES/NO

If 'YES', what do you require extra?

15. Do you like the soup powders?

(circle your answer)

NO/YES

If 'NO', why not?

SUNDRIES

16. Indicate whether there is sufficient of the listed items by circling the appropriate word(s).

SUGAR TOO MUCH ENOUGH TOO LITTLE

SALT TOO MUCH ENOUGH TOO LITTLE

CURRY POWDER TOO MUCH ENOUGH TOO LITTLE

17. Should other condiments be added to the rations, e.g. garlic powder, chilli powder, tomato paste?

(circle your answer)

YES/NO

If 'YES' which condiments would you like to see added?

CONFECTIONERY

18. Show how often you eat the following items in the field
(circle your answer)

CHOCOLATE NEVER RARELY SOMETIMES OFTEN ALWAYS

BUTTERSCOTCH ALWAYS OFTEN SOMETIMES RARELY NEVER

CHEWING GUM NEVER RARELY SOMETIMES OFTEN ALWAYS

For those confectionery items you never or rarely eat, please say why this is so.

Item: _____ Reason: _____

Item: _____ Reason: _____

Item: _____ Reason: _____

19. Should there be changes to the confectionery?

(circle your answer). YES/NO

If 'YES', what changes would you like to see? (Tick all appropriate boxes).

DARK CHOCOLATE []

MORE CHOCOLATE []

LESS BUTTERSCOTCH []

MORE BUTTERSCOTCH []

MORE VARIETY []

OTHER (please describe)

CANNED MEATS

20. The following series of questions asks you to give your opinion of the flavour for each canned meat item. There is also a heading "Problems" for each item. Examples of problems with these items might be "too salty", "too fatty", "not enough vegetables", "insufficient quantity", "not palatable cold", "nothing to chew on".

HAM & EGGS -

Flavour: VERY GOOD GOOD FAIR POOR VERY POOR

Problems: _____

BEEF & VEGETABLES -

Flavour: VERY POOR POOR FAIR GOOD VERY GOOD

Problems: _____

PORK AND BEANS -

Flavour: VERY GOOD GOOD FAIR POOR VERY POOR

Problems: _____

CORNED BEEF HASH -

Flavour: VERY POOR POOR FAIR GOOD VERY GOOD

Problems: _____

LUNCHEON MEAT TYPE II

Flavour: VERY GOOD GOOD FAIR POOR VERY POOR

Problems: _____

BEEF WITH GRAVY -

Flavour: VERY POOR POOR FAIR GOOD VERY GOOD

Problems: _____

Question 20. (cont)

SAUSAGES AND VEGETABLES

Flavour: **VERY GOOD** **GOOD** **FAIR** **POOR** **VERY POOR**

Problems: _____

LUNCHEON MEAT TYPE I

Flavour: **VERY POOR** **POOR** **FAIR** **GOOD** **VERY GOOD**

Problems:

BEEP & EGG -

Flavour: **VERY GOOD** **GOOD** **FAIR** **POOR** **VERY POOR**

Problems:

CORNED BEEF -

Flavour: **VERY POOR** **POOR** **FAIR** **GOOD** **VERY GOOD**

Problems:

21. Is there sufficient variety in the canned meats?

(circle your answer) YES/NO

If 'NO', which of the items are too similar?

22. Is too much use made of beef?

(circle your answer)

YES/NO

If 'YES', which of the following changes would you like to see?

PORK SAUSAGES

SOME CHICKEN

SOME VEGETARIAN MEALS

OTHER (please describe):

CANNED FRUIT

23. What was your opinion of the canned fruit? Please circle the appropriate answer below for each canned fruit for flavour.

Peaches VERY GOOD GOOD FAIR POOR VERY POOR

Pears VERY GOOD GOOD FAIR POOR VERY POOR

Two fruits VERY GOOD GOOD FAIR POOR VERY POOR

24. Would you like to see any of the following changes made to the fruit?
(circle your answer) YES/NO

If YES, what changes would you make? (tick appropriate boxes)

GREATER VARIETY e.g. tropical fruit salad ()

INCREASE THE CAN SIZE

REPLACE SOME CANS WITH DRIED FRUIT

OTHER (please describe):

GENERAL

25. If two new items could be added to the ration pack, what foods would you add?

1.
2.

26. If items had to be dropped from the ration pack, which two would you prefer to delete?

1.
2.

27. In general is there enough food in each ration pack?

(circle your answer) YES/NO

28. Is the packaging suitable?

(circle your answer) NO/YES

If 'NO', what changes are needed?

29. Was the toilet paper satisfactory?

(Circle your answer). YES/NO

If NO, how could it be improved?

30. List any further suggestions you have for improving this ration?

Thank you for taking the time to fill in this form. Your cooperation will help us to improve the acceptability of the Combat Ration One Man.

COMBAT RATION (ONE MAN)**CONTENTS AND INSTRUCTION SHEET**

This Ration Pack is available in five menus—A, B, C, D and E. The contents of each menu differ in the items shown in the following lists. You should endeavour to have a different menu each day.

A	B	C	D	E
Ham & Eggs 1 x 110 g	Pork & Beans 1 x 110 g	Luncheon Meat Type 111 x 110 g	Sauage & Veg. 1 x 110 g	Beef & Eggs 1 x 125 g
Jam, Plum 1 x 26 g	Jam, Raspberry 1 x 26 g	Jam, Apricot 1 x 26 g	Jam, Blackberry 1 x 26 g	Jam, Peach 1 x 26 g
Curry Powder 1 x 3.5 g	Curry Powder 1 x 3.5 g	Curry Powder 1 x 3.5 g	Soup Pdr., Beef 1 x 6.5 g	Soup Pdr., Chicken 1 x 6.5 g
Beef & Vets 1 x 227 g	Canned Beef Hash 1 x 225 g	Beef with Gravy 1 x 225 g	Luncheon Meat Type 1 1 x 125 g	Canned Rice 1 x 225 g
Rice Freeze Dried 1 x 55 g	Rice Freeze Dried 1 x 55 g	Rice Freeze Dried 1 x 55 g	Potato & Onion Dishes 1 x 50 g	Potato & Onion Dishes 1 x 50 g
Peaches 1 x 140 g	Pearls 1 x 140 g	Two Fruits 1 x 140 g	Two Fruits 1 x 140 g	Two Fruits 1 x 140 g

DPE 70-26

The following items are common to all menus:

Corned Beef 1 x 56 g	Sweetened Condensed Milk 1 x 71 g	Matches 1 box
Biscuit Survival 2 x 42 g	Sugar 12 x 7 gms	Can Opener 1 x Nos
Biscuit Standard 1 x 83 g.	Tea Bags 2 x Nos	Rubber Band 1 x Nos
Chews 1 x 47 g	Instant Coffee 2 x 3.5 g	Toilet Paper 1 x 10 sheets
Chocolate 1 x 50 g	Salt 1 x 7 g	Pad Scouring with Soap 1 x Nos
Chewing Gum 1 x 4 pellets	Fruit Drink Powder 1 x 14 g	
Candy Buttons/soak 1 x 50 g		
Bitter Concentrate 1 x 26 g		

